

description seems to be based on a single tree now growing on the campus of North Carolina State University (Raleigh) which was discovered in the wild in North Carolina in 1930. Apparently the cultivar is not being asexually propagated for the horticultural trade. Taxonomically, 'Rotundiloba' and the specimen I have described might best be treated as a single form. I have found no reports of the round-lobed forms from natural habitats in Virginia. It is possible that round-lobed variants of *L. styraciflua* result from a single recurring mutation with pleiotropic effects. Dirr (1990) reported a branch reversion to the typical leaf shape in 'Rotundiloba' so the mutation may be somatic.

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## Ecological Notes on the Amphibians and Reptiles of the Naval Surface Warfare Center, Dahlgren Laboratory, King George County, Virginia

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The Virginia Department of Conservation and Recreation, through its Division of Natural Heritage was contracted in 1991 to conduct a natural heritage inventory of the Naval Surface Warfare Center, Dahlgren

Laboratory (NSWC DL), in King George County, Virginia. The goal of the inventory was to identify, through field surveys, all of NSWC DL's important natural heritage resources. By definition, this included those sites

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supporting unique or exemplary natural communities, rare plants and rare animals, and other significant natural features (Buhlmann & Belden, 1992). We summarize here our observations on the amphibian and reptile species encountered in the course of this project.

King George County has not been well-explored herpetologically. Reed (1957) published several initial observations and Hill & Pierson (1986) listed the species they observed in Caledon State Park, located 12 km west of NSWCDL along the Potomac River. Tobey (1985) and Mitchell (1994) included all known records on their distribution maps. Some of the observations reported here represent the first county records supported by voucher specimens.

#### STUDY SITE

NSWCDL is located in King George County, Virginia

and lies entirely within the northern Coastal Plain physiographic region. NSWCDL has been operated by the U.S. Department of the Navy since 1919. The facility covers approximately 1758 ha (T. Wray, personal communication). It is bordered by the Potomac River on the east. Narrow coastal beach scrub habitat exists along the Potomac River. Upper Machodoc Creek divides NSWCDL into two sections. The northern portion (Mainside) is bordered by U.S. Rt. 301 on the north and the town of Dahlgren on the west. Mainside is further divided by north-south flowing Gambo Creek. The southern portion is called Tetotum Flats and includes a wetland known as Black Marsh. Gambo Creek and Black Marsh are extensive freshwater/brackish tidal marsh systems. Forested habitat provides buffers for much of the these aquatic systems. Natural terrestrial vegetation throughout the area includes loblolly pine (*Pinus taeda*) and oak-dominated hardwood forests.



Figure 1. Forested wetland swale in the northwestern corner of NSWCDL, King George County, Virginia. Photograph by K. A. Buhlmann, 6 November 1991.





Figure 2. Gambo creek on NSWCDL, King George County, Virginia. Photograph by K. A. Buhlmann, 6 November 1991.

The topography of NSWCDL is flat with elevations ranging from 0 to 10 m above sea level. The entire area is underlain by one soil association, the Tetotum-Bladen-Bertie. These soils are deep, moderately well drained to poorly drained and have a clay loam, sandy clay loam, or clay subsoil. This soil type is typically found in broad, low lying areas (Isgrig & Strobel, 1974).

Average annual temperature is 13.9° C. Temperatures above 42° C and below -17° C are rare (Isgrig & Strobel, 1974). Maximum temperatures above 32° C occur about 30 days per year. Some mild periods occur in winter and occasional periods of dry, mild weather replace warm, humid air in summer. Annual precipitation averages 100 cm. Average monthly precipitation ranges from 11.7 cm in July to 6.1 cm in February and November. During the summer months of 1991, the area experienced periods of drought.

NSWCDL has been altered extensively by military use and approximately 40% is considered developed or residential (TES, Inc. 1978). Most of the development occurs primarily in the area immediately north of Upper Machodoc Creek. Most of NSWCDL had been cleared of timber in the past and large cleared areas are maintained currently for an airplane runway on the Mainside section and an explosives-use area in Tetotum Flats. Stands of planted loblolly pine forests and two impoundments occur on the facility. Disturbances such as explosives detonation are ongoing.

An area of forested wetland swales is located in the northwestern portion of NSWCDL. The swales drain south to the north end of the airport runway. The swales border Co. Rt. 614 on the west and extend northward beyond NSWCDL boundaries, across U.S. Rt. 301, and onto Mathias Point Neck. These wetlands were the focus



of intensive field surveys during this study because they were believed to contain the greatest biodiversity.

The forested wetland swale consists of several seasonally-flooded, parallel low troughs in flat topography. The swale is further sub-categorized as extensive forested wetland and herbaceous wetland in a recently clearcut area. Tree species found in the forested wetland include *Acer rubrum*, *Nyssa sylvatica*, *Liquidambar styraciflua*, *Quercus alba*, *Quercus phellos*, and *Quercus palustris*. The shrub layer is sparse to non-existent. The herb layer includes *Carex* sp. and *Sphagnum* sp.

Several firebreaks bisect the swales. The east-west firebreak probably interferes with natural surface water flow. The wreckage of an airplane found in the northern portion of the forested wetland may once have contributed oils and gasoline to the surface and groundwater.

#### FIELD SURVEY METHODS

A drift fence array was erected in the forested wetland swale on 23 April 1991 and operated until 8 May 1992. The array consisted of three 7.5 m arms of aluminum flashing with a 19 liter (5 gallon) plastic bucket sunk flush with the ground at each end. The arms were arranged in an exploded spoke pattern with the interior ends of each arm being 7.5 m from the imaginary center point. Dilute formalin and water solution was used to preserve specimens. The drift fence/pitfall array was checked approximately every two weeks. All specimens were deposited in the Virginia Museum of Natural History, Martinsville, Virginia.

In addition to drift fence methods, terrestrial habitats were searched for salamanders. Some frog species were identified by their vocalizations. Specific efforts were made to determine the presence of ambystomatid salamanders during their late-winter breeding period. We identified and recorded all reptiles encountered during the field surveys. We observed basking turtles with a spotting scope or binoculars in Gambo Creek, Black Marsh, and the impoundments.

#### Annotated species list

##### 1. *Ambystoma maculatum* (Shaw)

Six spotted salamanders (2 adult males, 2 adult females, 2 juveniles; VMNH 2213-2218) were collected in pitfall traps only in spring sampling periods. These specimens represent the first verified county records

(Tobey, 1985). Spotted salamanders have also been observed in Caledon State Park (Hill & Pierson, 1986).

##### 2. *Ambystoma opacum* (Gravenhorst)

Marbled salamanders were the most numerous species caught in pitfall traps. A total of 73 were caught throughout the sampling period (33 males, 38 females, 2 juveniles; VMNH 2219-2289). An adult was found under a log in the forested wetland swales area on 6 November 1991 during which time the swales were dry. Most were caught in the fall (53%) or spring (25%).

We observed a great amount of variation in dorsal pattern in this population. Of the 71 individuals, 31 displayed the normal crossbar pattern, 4 had complete longitudinal stripes, and 36 (51%) had an unusually high incidence of a combination of crossbars and partial stripes. Of 33 males, 21 had crossbars, none had stripes, and 12 had the combined pattern. Of 38 females, 10 had crossbars, 4 had stripes, and 24 had the combined pattern. Hill & Pierson (1986) observed this salamander in Caledon State Park. Our specimens provide the first vouchered county records (Tobey, 1985).

##### 3. *Plethodon cinereus* (Green)

A total of 29 red-backed salamanders were caught (12 males, 9 females, 8 juveniles; VMNH 2292-2320) in fall and spring sampling periods. Twenty of these lacked the reddish dorsal stripe (i.e., were the "lead-backed" phase) and 9 possessed this character. Numerous records exist for this species in King George County (Tobey, 1985).

##### 4. *Bufo americanus americanus* Holbrook

The 15 individuals recorded during this survey (VMNH 2321-2335) were all caught in the drift fence/pitfall array from late-April to late June and in September to early-October. These specimens represent the first verified county record for American toads (Tobey, 1985). They have also been observed in Caledon State Park (Hill & Pierson, 1986).

##### 5. *Hyla chrysoscelis* Cope

This species was identified based on the presence of only Cope's gray treefrogs in the Virginia Coastal Plain (J.C. Mitchell and C.A. Pague, unpublished). A single adult female (VMNH 2336) was found in a pitfall trap in May 1992. This gray treefrog was observed in Caledon State Park by Hill & Pierson (1986). It is the first vouchered record for King George County.

6. *Pseudacris crucifer* (Wied)

Eleven adult spring peepers (VMNH 2337-2347) were found in pitfall traps in spring samples. Hill & Pierson (1986) observed this species in Caledon State Park. Our specimens provide the first verified county records.

7. *Pseudacris triseriata feriarum* (Baird)

Eight upland chorus frogs (VMNH 2348-2355) were caught in pitfall traps. All were caught in spring and late summer sampling periods. These are the first voucher specimens for King George County.

8. *Rana catesbeiana* Shaw

Two juvenile bullfrogs (VMNH 2356-2357) were caught in pitfall traps in the September-early October sampling period. This species was observed frequently in the permanent waters of upper Gambo Creek. Bullfrogs have also been observed in Caledon State Park (Hill and Pierson, 1986). Our specimens provide the first vouchers for King George County.

9. *Rana clamitans melanota* (Rafinesque)

Adult green frogs were observed at one of the impoundments, Hideaway Pond, on 21 May 1991. Hill & Pierson (1986) observed this species in Caledon State Park. The single specimen we collected (VMNH 2358) was found in a stream feeding Hidden Lake.

10. *Rana sphenoccephala* Cope (in recent literature as *Rana utricularia*).

Twenty-one southern leopard frogs (VMNH 2359-2366, 2367-2379) were caught in the pitfall traps in May, June, and September-early October. Two-thirds (14) were juveniles. Adult male captures (5) slightly outnumbered females (2). Juveniles of this species were the most commonly observed frog on NSWCDL. The wetland swales may provide suitable dispersal habitat, but not during dry periods like the one in 1991. These specimens represent new county records (Tobey, 1985).

11. *Eumeces fasciatus* (Linnaeus)

Four individuals of the five-lined skink (VMNH uncatalogued) were caught in pitfall traps in spring during both 1991 and 1992 sampling periods. Three additional localities in King George County are represented by museum specimens (Mitchell, 1994).

12. *Diadophis punctatus edwardsii* (Merrem)

A single adult northern ring-neck snake (VMNH uncatalogued) was caught in June in a pitfall trap. Three

vouchered localities are known for King George County (Mitchell, 1994).

13. *Nerodia sipedon sipedon* (Linnaeus)

Several northern water snakes were observed at Hideaway Pond on 21 May 1991. One verified record (Mitchell, 1994) and one additional unvouchered locality (Hill & Pierson, 1986) exist for King George County.

14. *Chelydra serpentina serpentina* (Linnaeus)

A single snapping turtle was observed in upper Gambo Creek on 22 May 1991. This observation is the first record for King George County (Mitchell, 1994).

15. *Chrysemys picta picta* (Schneider)

Eastern painted turtles were observed at Black Marsh and Hideaway Pond on 21 May 1991 and in upper Gambo Creek the following day. Other unvouchered locations known for King George County are "N of Maple Grove" (Reed, 1957) and Caledon State Park (Hill & Pierson, 1986).

16. *Kinosternon subrubrum subrubrum* (Bonnaterre)

One eastern mud turtle was seen in brackish water habitat on lower Gambo Creek on 21 May 1991. This is the second recorded observation of this turtle in King George County (Hill & Pierson, 1986; Mitchell, 1994).

17. *Pseudemys rubriventris* (LeConte)

We observed red-bellied turtles in impoundments and in Gambo Creek. A previous report had listed *Pseudemys* sp. as occurring on this site (TES, Inc., 1978) that was probably this species. Hill & Pierson (1986) reported a specimen from Caledon State Park. Our observation represents the second observation for this species in King George County.

## DISCUSSION

The number of amphibian and reptile species now known for King George County totals 44, including 8 salamanders, 12 anurans, 7 freshwater turtles, 6 lizards, and 11 snakes. The observations reported here for the Dahlgren Naval Weapons Laboratory and those of Hill & Pierson (1986) provide the only information on the seasonal occurrence and habitat affinities of these animals in the county. Several common species known to occur in surrounding counties remain to be verified, however, suggesting that this area promises to yield additional county records.



The goal of the survey was to search specifically for rare species (Buhlmann & Belden, 1992). Therefore, our list of amphibians and reptiles is probably incomplete because certain habitats were not studied. For example, no rare snake species were expected to occur on NSWCDL, therefore appropriate snake habitat was not thoroughly investigated. No rare amphibians or reptiles were found during the survey. However, several state-rare invertebrates were collected and deposited in the Virginia Museum of Natural History (Buhlmann & Belden, 1992).

The forested wetlands were studied extensively for their potential for tiger salamanders (*Ambystoma tigrinum*), greater sirens (*Siren lacertina*) and carpenter frogs (*Rana virgatipes*). None of these species were found and they are not believed to occur on NSWCDL. Two of the rare amphibians, the greater siren and carpenter frog, require semi-permanent water. The drought in the summer of 1991, which caused the swales to dry for much of the year, prevented any amphibian reproduction that year and precluded the discovery of these two species. In Virginia, the tiger salamander has only been found in sinkhole ponds and depressions with deep water and open canopies (Pague & Buhlmann, 1991; Buhlmann & Hobson, 1996). We believe that the swales are too shallow and too heavily canopied by trees for this species. The impoundments are stocked with game fish and are unlikely to provide appropriate habitat for these amphibian species.

Although not a rare species, the wood frog (*Rana sylvatica*) was reported as occurring on NSWCDL (TES, Inc. 1978). We encountered no evidence to suggest that a breeding population was present. The nearest known localities for this species are on Fort A.P. Hill, Caroline County (J.C. Mitchell, unpublished data) and in Stafford County (Tobey, 1985).

Management recommendations for protecting the forested swale habitat and providing a buffer habitat in the surrounding upland forest were made in a previous report (Buhlmann & Belden, 1992). Amphibians and reptiles that occupy forested wetlands often utilize adjacent uplands for dispersal, overwintering, and other functions (Buhlmann et al., 1993). Of particular conservation concern were the old ditch lines that still exert a negative impact on the natural ecology of the swales because they channel water out of the area and facilitate draining. The ditches may limit the ability of the wetlands to retain water, thereby diminishing the opportunities for amphibian reproduction. Clearcut operations at the southern end of this wetland system have already seriously jeopardized the ecological integrity

of this site. Any plans to remove timber from the remaining old swamp hardwood forest would destroy the ecology of this forested wetland swale community.

In conclusion, although few rare species were found, a diversity of habitats occurred on NSWCDL. The proximity of the site to the Potomac River makes it important to migrating songbirds and waterfowl. The freshwater wetland habitats support a relatively diverse amphibian, reptile, and invertebrate fauna for this small area.

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## Scotch Broom, A New Host of Two Native Bugs in Virginia (Heteroptera: Alydidae)

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A new host relationship for two native heteropterans, the alydids *Alydus eurinus* (Say) and *Megalotomus quinquespinosus* (Say), was discovered during recent fieldwork in Virginia. Their association with an introduced shrub, Scotch broom (*Cytisus scoparius*; Fabaceae) is reported in this note.

### The Host Plant

Scotch (or common) broom, indigenous to western Europe, is a wiry, much-branched deciduous shrub with green stems and bright yellow flowers (Everett, 1981). It has been introduced to the Pacific Northwest and to eastern North America as an ornamental and as a soil binder that retards erosion and stabilizes coastal sand

dunes (Bossard & Rejmanek, 1994). In Virginia, Scotch broom has been planted since the eighteenth century, having been recommended for hedges by Thomas Jefferson (Leighton, 1976). This woody legume has become a serious weed of western rangelands, and it also displaces native plants in the Sierra Nevada foothills, hindering reforestation and increasing the fire hazard among older trees. Several Old World insects that specialize on broom have been imported and released for the biological control of this plant in the West. Such attempts, however, have not reduced its densities (Frick, 1964; Bossard & Rejmanek, 1994).

Although not considered pestiferous in the East, Scotch broom sometimes escapes from cultivation. It has become naturalized from Nova Scotia to Virginia. In the